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CONSTRUCTION AND RELATED INDUSTRIES

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CONSTRUCTION PLANNING AND ECONOMICS

COST ADVANTAGE OF BLOCK CONSTRUCTION UNDERSCORED

Alma-Ata NARODNOYE KHOZYAYSTVO KAZAKHSTANA in Russian No 6, Jun 83 pp 70-71

[Article by E. Beysenbayev, director of the GGPI Institute "Kazgrazhdansel'proyekt": "Volume Blocks are Expedient"]

[Text] The most important condition ensuring the construction of improved residential houses with household accommodations, children's preschool institutions, clubs, libraries and other facilities for cultural-domestic use in rural areas is the continued industrialization of construction. At the present time there are several methods to this end. Therefore, it makes sense to compare their advantages and disadvantages.

Erecting buildings from fully prefabricated elements. This method shortens the cycle of erecting the object and reduces the labor expenditures and need for temporary structures. The conditions for mechanization and automation of production processes are improved. However, experience has shown that fully prefabricated construction is effective only on a large work scale, with a sufficient concentration of the projects, and in the presence of a strong production base located in relative proximity to the new construction sites.

As a rule, however, in rural areas the projects are scattered and removed from the building industry enterprises. With long distance transport, the cost of the products is sharply increased. At the same time, it is difficult to ensure their complete safety en route. All this reduces the profitability of building production and the use coefficient of production base capacity.

Brick construction. Its relative share in the structure of rural residential construction is over 70 percent. Brick is inexpensive, and buildings made of it are considered to be long-lasting. Nevertheless, the reliability and safety of brick structures in seismic zones is a problematic question.

As concerns the low cost, contractors know very well how high the labor expenditures are in brick house construction. Over 80 percent of the facade area and 90 percent of the inside walls must be finished by hand with various mortars. This method of construction is not easily subject to industrialization.

Thus, an analysis of the design decisions for buildings currently erected in rural areas by the methods given above shows a low level of their construction technological efficiency. It is no wonder that the rural residential houses built in the 10th Five-Year Plan are characterized by heavy weight, averaging 3 tons per 1 m² of given area. A multitude of products is used--up to 284 pieces per 1 m² of overall area. The construction times for such one- and two-story residential houses are presently three to four times greater than the norm. All this leads to the situation where the funds allocated for these purposes are not assimilated for years.

Thus, we may conclude that it is impossible to rationally solve the problem of rural restructuring using presently existing construction methods alone. Consequently, new and more effective means must be sought. One of these has been found. This is monolith volume-block industrial construction (MOBIS). Positive experience in its application has been accumulated in the USA, FRG, and other countries. In our country it is being successfully used by Georgian builders.

In Kazakhstan this new direction in construction is being developed by the "Kazgrazhdansel'proyekt" and "KazpromstroyNIIproyekt" institutes. It is based on the application of a portable forming machine for making reinforced concrete volume blocks for residential houses and social-cultural domestic facilities at the construction site. The entire construction process is performed according to a single technology.

Specialists at the "Kazgrazhdansel'proyekt" Institute have developed a project plan for introducing this innovation for the existing nomenclature of rural residential houses, children's nurseries for 90 and 140 students, schools for 13 classes, sector hospitals for 150 beds, as well as dormitories.

The forming machine is placed directly on the construction site (a site is taken to be one facility, rural residential block, or complex of facilities). After installation of the building or group of objects is completed, it is moved to another site (another sovkhoz). A specialized brigade is assigned to each machine.

The portable forming machine is used to make "dome" type volume blocks.

The design scheme of public buildings built of these new elements depends on the dimensions of the accommodations. Unified module dimensions for by-story volume blocks have been determined: 3900 x 6000 and 3000 x 6000, with height of 2700 (3300) and 1800 mm--for attics. The different height of the products and the necessary apertures are obtained by using the appropriate stock units during installation. A variant for making spherical surface roofing elements is provided. For this purpose, a molding accessory for the ceiling party of the core is added to the machine. On the whole, only four or five dimensions of volume blocks are provided for erecting rural residential and civil buildings of all types, including three variants of outside walls: those made of single-layer keramzit concrete, thin-walled reinforced concrete walls with suspended keramzit concrete panels, and triple-layer walls with effective insulation.

Local construction materials may be used in making volume blocks--ash concrete, arbolite, and others. Using the same volume blocks for residential houses and for public buildings ensures the profitable operation of the forming machines.

The new method has a number of significant advantages over the traditional ones. Thus, the location of technological lines intended for the manufacture of monolith volume blocks directly at the construction sites makes it possible to reduce capital investments for the creation of a branch industrial base and at the same time makes it possible to increase the industrialization of construction in regions which are far removed from the contractor's home front. Transport expenditures are reduced, while the possibility of erecting facilities of various functional purpose from blocks having only four or five dimensions leads to a reduction in labor and material consumption of the buildings. Less skilled workers may be used for installation and construction work.

The application of volume blocks as the basic load-bearing elements having high spatial rigidity makes it possible to erect facilities which vary in their external appearance, story height, planning and functional purpose without restructuring the production base or retooling the operating technological equipment. This is important for full-scale rural construction.

Practical experience in the application of the new system abroad and in this country has shown that the effectiveness of monolith volume block house construction significantly increases where the seismic activity is higher and the soil conditions are poorer.

Technical-economic computations confirm the great advantage which MOBIS promises to rural builders in our republic. For example, in erecting buildings with various functional purpose, the following savings computed per 100,000 m² of overall building area may be achieved:

estimated cost of construction--1 million rubles;
steel (cited for class A-1 steel)--380 tons;
cement M-400--890 tons;
lumber, cited for logs--5,700 m³;
brick (in replacing brick buildings)--21.1 million pieces;
plant and site labor expenditures--210,000 man-days.

The "Kazgrazhdansel'proyekt" Institute has developed a project for the construction of a building complex with the aid of the new method at the Sevkhoz imeni Frunze in Alma-Ata Oblast. The first phase of the new construction consists of 33,900 m² of residential space and 12,000 m² of public buildings. The innovation will make it possible to reduce the estimated cost of construction by 435,000 ruples. These funds may be used to build in excess of an additional 2,000 m² of residential housing.

The plans prepared by the "Kazgrazhdansel'proyekt" Lead State Project Institute for the introduction of the MOBIS system in the republic have been approved by "Gosgrazhdanstroy" of the USSR Gosstroy and recommended for application in rural construction.

Of course, the new direction in industrial residential and civil construction in rural areas, which is based on original progressive technology, has not yet gained a strong position. It is making only its initial steps in Kazakhstan. However, by its technical idea, directed toward a radical solution to the problem which has come to the forefront in rural construction, the system of monolith volume-block construction based on the application of portable forming machines undoubtedly meets the needs of the times.

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CONSTRUCTION PLANNING AND ECONOMICS

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BANK FINANCING OF RETOOLING DISCUSSED

Moscow EKONOMIKA STROITEL'STVA in Russian No 5, May 83 pp 8-14

[Article by Professor P. D. Podshivalenko: "Retooling and Bank Credit"]

[Text] The most important problem of the current stage of building communism is that of increasing the effectiveness of social production and the quality of all work in every possible way. Social production must move over decisively to the intensive path of development.

Important directions in solving this problem are a substantial expansion in the scale of retooling and rebuilding existing enterprises, the reequipping of them with new and highly effective equipment, the introduction of progressive technology, and the scientific organization of work and production facilities.

Each year about 20 billion rubles are allocated to retooling and reconstructing existing enterprises. In accordance with the State Plan for the Economic and Social Development of the USSR for 1983, 1.1 billion rubles more will be used for these purposes than was called for by the five-year plan, that is, 23.9 billion rubles.

Data about the reproduction structure of capital investment for recent years indicates that the share of expenditures for retooling and rebuilding is growing, albeit slowly. Thus, in 1979, 37 percent of all capital investment in industry was aimed at new construction, 30.2 percent at retooling and rebuilding existing enterprises, 28.6 percent at expanding existing enterprises, and 4.2 percent at maintaining the capacity of existing enterprises, while in 1981 the figures were, respectively, 36.4, 32.9, 26.5 and 4.2 percent. During the 1981-1985 period capital investment for these purposes is to increase by 21.2 percent--more than double the pace for all capital investment under the state plan.

Expenditures for retooling and reconstruction are being recouped three times as rapidly as expenditures for creating similar production capacity by means of new construction, and, in so doing, the periods for putting capacity into operation are reduced, the requirement for the work force is reduced, and yield on capital grows 1.5-fold.

A factor of no little importance in favor of retooling and rebuilding is, moreover, the necessity for avoiding nonproductive expenditures because of the

operation of obsolescent and physically old equipment. The age structure of equipment in basic production at present is described by the data shown in the table.

[Ministries and the national economy]	Share of equipment in basic production (in percent) by period of service		
	Less than 10 years	10-20 years	20 years or more
Total for the national economy.....	66	27	7
For the chief machinebuilding industries:			
Minenergomash [Ministry of Power Machine Building].....	62	24	14
Minstankoprom [Ministry of Machine Tool and Tool Building Industry].....	60	29	11
Minsel'khozmash [Ministry of Tractor and Agricultural Machine Building].....	62	27	11
Minzhivmash [Ministry of Machine Building for Animal Husbandry and Fodder Production.].....	74	21	5
Minstroydormash [Ministry of Construction, Road and Municipal Machine Building].....	62	31	7

At ferrous-metallurgy enterprises more than 40 percent of all the equipment has been in operation for more than 10, 20 and even 40 years. Matters are no better in the coal industry, some branches of the building-materials industry and many group B industries.

It should be kept in mind that, while in the past the service life of equipment was 20-25 years, nowadays it has been cut to one-half or one-third, and the artificial lengthening of the service life of equipment, including obsolete equipment, hinders introduction of the newest achievements of scientific and technical progress and degrades the indicators of the production and financial activity of associations and enterprises. So it is necessary not simply to restore or to replace aging equipment with new copies of such machinery but to use more improved equipment that meets the modern demands of science and technology.

One of the directions of retooling is that of providing enterprises with new equipment. During 1981 alone 322,600 new-equipment measures (the introduction of progressive technology, equipment and computers, the mechanization of production, the mastery of new types of industrial output, the modernization of existing equipment, and so on) were completed. The additional profit obtained from introducing the measures enumerated was 1.4 billion rubles, the annual economic benefit was 3.1 billion rubles, the number of constructively released workers came to 205,600, and the actual costs for introducing the measures for new equipment proved to be 12.7 percent lower than the budget estimate.

According to USSR TsSU [Central Statistical Administration] data, 1,849,000 units of equipment, 1,671,000 of them new, were installed at enterprises of industrial ministries and agencies in 1981. The share of new equipment in the

total amount installed in 1981 at machinebuilding-ministry enterprises was 86-97 percent.

Retooling helps to increase the share of expenditures on equipment in the technological structure of capital investment: this share was 46 percent during the Ninth Five-Year Plan, 45 percent during the 10th, and 48 percent during the first 2 years of the 11th Five-Year Plan (estimated data).

It must be noted, however, that despite the existence of a large amount of obsolete equipment, ministries and agencies sent the predominant share of the machinery being delivered (more than 60 percent) to newly constructed enterprises and facilities. This indicates that many industries are still oriented to increasing production capacity by building new enterprises and expanding existing ones (65.5 percent in 1979 and 64.9 percent in 1981).

Capital investment's technological structure for machinebuilding, which retools and rebuilds, is much better than for industry as a whole. Thus, while executing these measures during the 10th Five-Year Plan, the machinebuilding ministries allotted only 15 percent of the capital investment to the passive portion of fixed capital, and, during the 11th Five-Year Plan period, it is planned to reduce this share to 13 percent. In this case, this investment will be less than a third as much as for production-type construction in the national economy as a whole. In some ministries the share of expenditures for construction and installing work is to be much less. For example, it should be 9 percent in Minpribor [Ministry of Instrument Making, Automation Equipment and Control Systems], 10 percent in Minelektrotekhprom [Ministry of Electrical Equipment Industry], 11 percent in Minsel'khozmash and 12 percent in Minkhimmash [Ministry of Chemical and Petroleum Machine Building]. Consequently, the share of equipment in capital investment's technological structure that is allotted to retooling and rebuilding machinebuilding enterprises reaches 80-85 percent. This leads to an increase in the economic effectiveness of capital investment: in the aggregate, for all branches of the socialist economy, a growth in the equipment share by about 1 percent is the same as giving a "free" increase of about a billion rubles in the production of output with the same amount of new production capital.

An analysis indicates, retooling is going on in machinebuilding at an outstripping rate. And this is consistent: it thereby satisfies the prerequisites for resolving this problem in all other branches of the economy.

During the 10th Five-Year Plan, 10.1 billion rubles were allotted to retooling (not counting rebuilding) by the leading machinebuilding ministries, or 36.4 percent of the total capital investment in facilities for production purposes, at a time when it was only 19 percent for the national economy as a whole. In so doing, in ministries such as Minpribor 70 percent of all capital investment was earmarked for these purposes, in Minstankoprom 57 percent, in Minlegpishchemush [Ministry of Machine Building for Light and Food Industry and Household Appliances] 54 percent, in Minstroydormash [Ministry of Construction, Road and Municipal Machine Building] 51 percent, and in Minelektrotekhprom 48 percent. Primarily intensive forms for updating fixed capital are to be retained in the machinebuilding branches also under the current five-year plan.

The predominance of retooling costs in total capital investment in the machinebuilding branches is one of the decisive causes of the outstripping increase in labor productivity in many of these branches in comparison with its growth in industry as a whole. While labor productivity increased for industry as a whole by 2.1 percent in 1982 over 1981, it increased 10 percent in power machinebuilding, 8 percent in chemical and petroleum machinebuilding, 7 percent in machine-toolmaking, 7 percent in instrumentmaking, and 7 percent in construction and road machinebuilding.

And, on the contrary, where the share of retooling has not only not grown but has even decreased, labor productivity has been increased not very substantially or it has even dropped. For example, it grew only 0.6 percent in light industry, 0.7 in power engineering, 1 percent in the oil industry, 0.2 percent in the coal industry and 0.3 percent in ferrous and nonferrous metallurgy.

Expenditures for retooling have an earmarked source of financing--the production-development fund.

Measures for mechanization and automation, the replacement and modernization of equipment, and improvement in the organization of production facilities and of work, as well as other measures for production retooling that are executed through resources of the indicated fund, are worked out and approved independently by the production associations (or enterprises). The measures are fully included in the ministries' and agencies' capital construction plans in accordance with the calculations and recommendations of the production associations (or enterprises), and they are supported by them in a priority procedure with the necessary ceilings of capital investment and contracting work and with materials and other resources (within the ceilings and the funds established for the appropriate ministries and agencies in the five-year plans, with breakdown by year). In order to execute the measures, the requirement for which arises during fulfillment of the annual plan, the corresponding expenditures can be made above the state capital investment ceiling through unused resources of the production-development fund and above-plan deductions into this fund. Where the fund is insufficient for financing the expenditures planned by the associations and enterprises, the resources required are granted them in the form of a long-term credit for the period of recoupment of the capital investment.

During the 10th Five-Year Plan, total credit for retooling existing enterprises exceeded 5.5 billion rubles. Through credit, 7,229 measures were completed, as a result of the introduction of which the annual production of output increased by 5.07 billion rubles, profit by 116.5 billion [as published] rubles.

In 1981, the first year of the 11th Five-Year Plan, USSR Stroybank granted credits to 964 enterprises, where 915 measures were completed. An analysis of the results of 430 of the measures indicates great economic benefit: annual production of output increased by 513.8 million rubles, additional profit by 31.3 million rubles, and 13,900 people were constructively released. Total expenditures were 630.5 million rubles, of which 47.5 percent was covered by credit.

As experience indicates, measures for retooling existing enterprises that are effected through bank credit are in most cases completed on time or ahead of time. During the 10th Five-Year Plan and the first years of the 11th Five-Year Plan, the proportion of such measures was more than 87 percent. For industry as a whole, little more than 40 percent of the retooling measures were carried out on time or ahead of time.

However, the share of credit for the costs of retooling existing enterprises is not great: for the national economy it averages 8.2 percent, and for machinebuilding less than 30 percent. Most enterprises have their own sources that are adequate for them to retool and rebuild, and the potential for redistributing their own resources within the ministries and agencies does not permit credit, with its monitoring functions, to be used actively for these purposes. It should be noted that the enterprises' production-development funds, after a definite portion of them has been allocated to financing expenditures for retooling, are being underutilized from year to year. During the 10th Five-Year Plan a stable 11-15 percent of the funds remained on the books of industrial enterprises at the end of the year.

A further intensification of production based upon retooling and rebuilding existing enterprises requires that some pressing problems be solved.

Despite the fact that the periods for taking steps to retool existing enterprises are 25-30 percent less than for new construction and expansion, they are still, on the average, fairly great, often being 4-5 years. One of the reasons for this is the fact that retooling work is done primarily in-house. In our opinion, it would be more desirable that this work be done by the prime suppliers of the equipment.

It was pointed out at the 26th CPSU Congress that machinebuilding enterprises should insure the delivery of outfitted equipment with a high degree of factory preparation, install it, perform the setting-up and startup operations, and turn this equipment over to the clients. The execution of deliveries of outfitted equipment and the installation thereof by the manufacturing plants will increase their motivation toward the final results and amplify their responsibility for the timely and complete provisioning of construction projects with equipment. In so doing, the final product of machinebuilding will be the equipment that has been manufactured and prepared at the factory for installation and has been installed and tested at the construction site. An experimental verification of the examined method at a number of enterprises that are under construction has confirmed its effectiveness.

The CPSU Central Committee approved in 1977 the experience of Ministry of Chemical and Petroleum Machinebuilding, which undertook to provide construction projects with outfitted industrial lines, taking on the role of prime supplier. The ministry supplies enterprises that are under construction completely with outfitted equipment that has a high degree of factory preparation, including apparatus, machinery and instruments that are produced by associations and enterprises of other ministries. The average annual economic benefit to the national economy from delivering outfitted equipment exceeds 200 million rubles. However, settlements between clients and equipment suppliers are made not for a set of equipment but for each separate element of it; the

supplying plants calculate the realized output and deduct the economic incentive funds, regardless of whether outfitting and installation have been completed or not.

Practice has also advanced other interesting initiatives in matters of delivering and installing equipment. In particular, an example of this is the outfitting-module method of construction, wherein the contracting organization installs modules on previously prepared footings. The experience of the Pervomaysk Machinebuilding Plant imeni 25 Oktobrya, which does for customers the work of installing, starting up and adjusting the diesels that they have manufactured and also performs overhaul, current repair and other services for their operation, also deserves attention. The Sumy Machinebuilding Association imeni M. V. Frunze is producing and assembling compressor installation modules and is installing them at the construction sites with their own forces. In this case, the need to construct permanent buildings is dispensed with, the time taken to build a compressor station is one-third as long, and capital investment is 40 percent less than for other similar units.

Such an organization of operations would be especially effective during the retooling of enterprises that is performed by the forces of the equipment-supplying plants. The latter can be given the right, in case of necessity, to enlist specialized contracting construction and installing organizations as subcontractors to do the work. Similar methods of delivery, installation and turnover of equipment for operation are being practiced by Soviet organizations where technical assistance is given to foreign countries.

It would be completely consistent to create in the country industrial associations (or firms) that are established on the basis of machinebuilding plants which will not only produce new equipment but also install it at newly built or expanded enterprises and will provide for the introduction of capacity into operation and for technical servicing of the fixed production capital that has been introduced during the operation thereof. The possibility of associations (or firms) performing retooling work based on these same principles is not excluded.

Also, the possibility of construction-industry associations (or firms) turning over equipment at enterprises they are building, expanding or rebuilding for lease by interested industrial production associations (at first by way of experiment) is also completely realistic, the idea being that the leases can prove to be more effective than the existing practice of levying payments for the use of capital on behalf of the budget. This can also be practiced in equal measure by those equipment suppliers who perform retooling operations at existing enterprises.

A restructuring of organizational forms for performing construction in the indicated direction and in directions similar to them should, in our view, be concerned primarily with the retooling of existing enterprises. One of the consequences of this will be an expansion of the role of credit in financing these operations.

If the principles for organizing retooling work that were set forth above are introduced, it inevitably becomes necessary to grant credits to machinebuilding

plants (or associations or firms) for expenditures for delivering the equipment and for uncompleted construction prior to turnover of the facilities for operation. The share of credits in these expenditures will exceed, as experience in the introduction of settlements for the commodity output from construction operations indicates, 80-85 percent. The resources of the production-development funds will become, prior to turnover of the completed operations to the clients, the source of the funds for granting credits. As before, long-term credit will compensate for an insufficiency of these funds. Thus, the activity of both the suppliers and clients will be monitored through the credit mechanism. Doing so undoubtedly will help to intensify the effect of monitoring fulfillment of plans for retooling--one of the decisive prerequisites for growth in labor productivity.

An analysis of economic practice will permit the conclusion to be drawn that it is desirable to use for retooling the share of amortization deductions that are intended for overhaul, with a reduction in expenditures for repair (about 32 billion rubles were spent in industry alone for these purposes during the 10th Five-Year Plan). A restriction on poorly effective overhaul will enable the technical level of existing production facilities to be raised and the requirements for additional work force and material resources to be reduced. As a matter of fact, branches of the national economy to which equipment is supplied are operating a system of repair enterprises, one of whose tasks is the fabrication of spare parts. It is known that the components of new machines include articles of great design and technological complexity. And so repair plants and departments are equipped with sets of the newest machine tools. But this does not require the elimination of handicraft work in the fabrication of spare parts. It is estimated that the fabrication of parts by this method expends 3-fold to 4-fold the labor that is expended at specialized machinebuilding enterprises, where there is large-series production, not to mention the costs of acquiring a machine-tool inventory.

It must also be considered that, when producing spare parts, repair enterprises use merchant bar instead of special forged blanks, which provokes an enormous overconsumption of materials. Clearly, it would be much more economical for the plants that manufacture the machines and equipment to ship the spare parts. However, the machine-tool industry satisfies spare-parts requirements by only 10-15 percent, and the share thereof in the total output volume of this branch is no more than 3-5 percent. For each worker engaged in the production of equipment and machinery, three workers are engaged in repairing them.

As a result, industry's overhaul costs exceed annual capital investment in machinebuilding by 20-22 percent.

In USSR Minchermet [Ministry of Ferrous Metallurgy], expenditures for overhauling machinery and equipment in 1982 exceeded the amount of capital investment for retooling by 57 percent--in nonferrous metallurgy by 26 percent, in the oil and chemical industry by 37 percent, and in the building-materials industry by 71 percent. For many types of equipment, expenditures for overhaul that are made over the entire service life greatly exceed the original cost. In this case, as a rule, the original technical and economic indicators of operating the machinery are not restored by overhaul. For example, the

physical longevity of metal-cutting machine tools is reduced by 10-15 percent and their productivity is cut by 5-10 percent. Meanwhile, specialists' calculations and economics practice both here and abroad indicates that restorative repair is economically justified when the expenditures on it do not exceed 25 percent of the original cost of the equipment.

In practice, rebuilding, retooling and replacement of obsolete equipment by new equipment that meets the demands of scientific and technical progress are actually being executed ever more frequently under the guise of overhaul. It can be said that this sort of "violation" reflects the processes of replacing dying-out methods of restoration and, to some extent, of modernizing other methods with more rational ones.

Obviously, it has now become necessary to decide approximately on the above-indicated maximum equipment wear at which it is desirable to overhaul equipment and machines and to unite the amortization sums that are thereby released with the production-development fund, for use in retooling. It would be desirable, basically, to transfer the repair plants that are organized within the ministries that acquire the implements of labor to the supplying ministries, making them into stations (or bases) at which the suppliers will service the equipment they have installed and introduced into operation for customers.

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CONSTRUCTION PLANNING AND ECONOMICS

PROCEDURES FOR CONDUCTING ECONOMIC EXPERIMENTS PUBLISHED

Moscow EKONOMICHESKAYA GAZETA in Russian No. 27, Jul 83, p 19

[Article: "Experiments in Construction"]

[Text] The Main Construction Science Administration and departments of the Economics of Construction and of Organization and Norm Setting for Labor in USSR Gosstroy have approved a "Temporary Statute on the Procedure for Planning and Carrying Out Experiments in Construction" (letter No 15-465 of 5 Apr 1983) which becomes effective starting 1 Jul 1983.

1. General Provisions

1.1 An economic experiment is a scientifically established experimental examination under precisely considered conditions of proposals that are presented in the form of approved systematic documents (systematic directions, recommendations) for improving the economic mechanism and organizational structure of management in the sector.

1.2 Proposals for improving the economic mechanism or its elements, organizational structures of management and processes of economic interrelationships between the participants in construction are the subject of an experimental examination.

1.3 An economic experiment is carried out with the following aims:

1.31 To determine the effect of the recommended proposals on reducing the duration of construction, improving labor productivity, the quality of a product, the efficient use of production funds, materials, labor and financial resources, strengthening economic policy and eliminating waste in construction; to determine the effect of the stimulating role of prices, new forms of wages and others.

1.32 To accumulate knowledge on applying experimental proposals and to discover the conditions for adopting something new in construction practice.

1.33 To finish working out the required systematic and normative documentation including establishing the nature and content of changes in legislative acts.

1.4 The procedure for preparing, planning and carrying out economic experiments in construction relates only to those experiments; the conditions for conducting these experiments need to be approved by union agencies.

2. The Procedure for Presenting and Selecting Proposals for the Plan

2.1 Proposals for conducting economic experiments may be presented by all participants in construction: construction and installation organizations and organizations with the same status as them, clients, enterprises in the construction industry, mechanization and motor vehicle transport, design and scientific research organizations, main administrations, individual persons, and also construction ministries and departments and union republic gosstroys.

2.2 Depending on the nature of the economic experiment proposals are directed to the head scientific research institutes in USSR Gosstroy: VNIPI [All Union Scientific Research and Design Institute] for Labor and Construction (107078, Moscow, B-78, Novaya Basmannaya, 21), NII [Scientific Research Institute] for the Economics of Construction (117331, Moscow, V-311, Vernadskiy Prospect, 29).

2.3 The selection of proposals is based on their urgency and long range nature as determined by the basic directions of the plan for the economic and social development of the sector.

2.4 The following must be stated in the proposals: the subject, purpose, goals, and the conditions for the experiment while indicating the hypothesis for the innovation and its expected effect.

2.5 A preliminary review of the proposals is made by a department or group of specialists in the head institute while enlisting workers from interested construction ministries, organizations and enterprises.

2.6 All proposals for conducting economic experiments are reviewed by the scientific council (section) at the head economic scientific research institute in accordance with its background.

2.7 The scientific council (section) draws a conclusion about the expediency of carrying out the experiment, the objects for conducting it and the limits of experimentation. Along with this the fact that complete data on this or that proposal often can only be obtained after conducting the experiment itself is taken into consideration.

2.8 Disagreements that arise during the course of discussing the proposals at the institute's scientific council are referred to the appropriate USSR Gosstroy department for resolution.

3. Working Out and Reviewing Systematic Materials

3.1 A positive resolution by the institute's scientific council or approval by a USSR Gosstroy department of the proposal that was presented is the basis for working out systematic materials for the economic experiment.

3.2 Systematic materials must include:

a draft of the systematic directions with detailed statements about the nature of the experiment;

an explanatory note illuminating the problems;

the status of the problem;

purposes and goals;

the object of experimentation;

a working hypothesis for the innovation and its effectiveness;

a calendar plan for conducting the experiment;

a plan for coordinating the participants in the experiment;

a method for analyzing the results of the experiment;

a form for completing the work.

3.3 The draft of the systematic materials for the experiment to be conducted according to the proposal by the initiators is drawn up by the authors together with workers in the appropriate department of the head institute.

3.4 A draft of the systematic materials for the experiment that is included in overall special-purpose (sector) programs is drawn up by the appropriate department in the head institute.

3.5 The subject for which a draft of the systematic materials for an economic experiment is drawn up is included in sector programs, and in the five-year and annual plans for the scientific research work of the head institute.

3.6 The subject for which a draft of the systematic materials for an economic experiment is prepared is financed by means of budget allocations.

3.7 The draft of the systematic materials is reviewed by the scientific council of the head institute together with representatives of interested construction ministries, departments, and union republic gosstroys subject to approval or refusal.

3.8 Disagreements arising during the course of discussing the systematic materials are reviewed by the management of the appropriate USSR Gosstroy.

4. Coordination and Approval of Systematic Materials

4.1 Drafts of systematic materials which have been drawn up and approved are presented by the head institute to the appropriate departments or administrations in USSR Gosstroy.

4.2 The USSR Gosstroy department together with the institute will preliminarily coordinate the draft of the systematic materials with union committees, ministries, appropriate construction and other organizations.

4.3 The systematic materials and possible differences of opinion are referred by USSR Gosstroy to MKZ [interdepartmental commission] under USSR Gosplan. They must contain the draft of the systematic directions, an explanatory note, the resolution of the NII scientific council and the USSR Gosstroy department, and a draft of the decree by the MKZ under USSR Gosplan pertaining to approval of the systematic materials.

4.4 Systematic materials approved by an inter-departmental commission are sent to the head institute and other participants in the experiment.

5. The Implementation Plan and Completing It

5.1 The subjects of implementing economic experiments are included in sector programs, and the five-year and annual plans for the scientific research work of the head institute after the approved systematic materials are received.

5.2 The subjects of implementing economic experiments are financed by means of budget allocations.

5.3 After the annual plan for scientific research work has been approved head institute together with the collaborators draws up a working program for carrying out the experiment in which the following are specified:

the procedure for organizing the training of the personnel who are to participate in the experiment;

calendar timetables and the sequence of completing specific work for the entire experiment;

a composite plan for completing specific work, a list of tasks for the executors indicating timetables, cost, and type of material being introduced.

5.4 Interested organizations in the sector under the systematic guidance of the head institute and the collaborators ensure that the experiment is carried out.

5.5 Conducting seminars and conferences, inspections and displays, forming consultation centers, publishing informational leaflets, articles and periodic press releases and others promotes successful experiments.

5.6 An analysis of the progress and results of the experiments are done on the basis of simultaneously submitting statistical reports on currently used and specially prepared forms. The work is organized by the economic services of the participants in the experiment and the materials of the analysis are submitted to the head institute.

5.7 The results are evaluated by means of comparing appropriate indicators before and after the experiment and also by comparing control projects with the experimental ones. On the whole the conditions necessary to promote a positive effect by the economic experiment on economic activity are defined.

5.8 The head institute and the collaborators systematically, but no less than once a year, review the results of the economic experiment being conducted. The institute reports the results of the review to the USSR Gosstroy department.

5.9 During the course of the experiment the head institute and the collaborators can make suggestions to improve its conditions. Suggestions that change the original nature of the experiment must be approved according to the above-mentioned procedure.

5.10 The head institute reports the final results of conducting the experiment to the USSR Gosstroy department. The nature of the experiment, a brief description of its results and appropriate recommendations are written up in the report. Both positive and negative results of the experiment are important for further improving the economic mechanism and organizational structures of management. The head institute does a follow-up of the results of the experiments.

5.11 Suggestions for improving the economic mechanism and the organizational structures of management in the sector that have been tested according to the experimental procedure and evaluated positively are a potential to be included in drafts of decrees by directive agencies in the interests of being adopted generally.

5.12 The procedure stated above of preparing, planning and carrying out experiments extends to complex economic experiments also.

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CONSTRUCTION PLANNING AND ECONOMICS

NEW PROCEDURES FOR DRAFTING CONSTRUCTION ESTIMATES ADOPTED

Moscow EKONOMICHESKAYA GAZETA in Russian No. 29, Jul 83, p 16

[Article: Procedure for Drafting Estimate Documentation]

[Text] On 1 Jan 84 new estimate norms and prices will be adopted in construction. In this regard USSR Gosstroy, USSR Gosplan, the USSR Ministry of Finance, and USSR Stroybank, in letter No 35-D dated 16 May 1983 establish the following procedure and timetables for drafting and converting estimate documentation:

estimate documentation for structures and projects that are newly begun in 1984 must be drafted according to the new estimate norms and prices before 1 Oct 83 and its coordination and approval must be done before 1 Nov 83.

Item estimates for structures that are carried over to 1984 and newly begun in 1984, the estimate documentation for which was worked out under the norms and prices of 1969, must be recalculated according to the appropriate indices before 1 Aug 1983. The direct conversion, coordination and reapproval of these estimates based on the new estimate norms and prices must be completed:

before 1 Nov 1983 for projects that are specified to be started up in 1984;

before 1 Apr 1984 for projects that are specified to be started up in 1985 and subsequent years.

The cost of construction and installation work that is subject to be completed in 1984 and in subsequent years is determined:

for projects that are specified to be started up in 1984 by originating with the actually completed construction and installation work on 1 Jan 1983 and that which is expected to be completed in 1983. In certain cases, when the actual completed work for 1983 differs from that expected to be completed the converted estimates are adjusted in the first quarter of 1984;

for projects that are specified to be started up in 1985 and in subsequent years by originating with the actually completed work based on data from the initial estimates on 1 Jan 1984.

Estimate documentation for projects that are newly begun in 1984 and which are located in the far North or in locations that are comparable to it must be drafted before 1 Aug 1983 under the norms and prices of 1969 while using the appropriate indices. A conversion of the estimate documentation for the above

projects using the norms and prices put into effect on 1 Jan 1984 must be completed before 1 Apr 1984.

In connection with making the timetables for drafting new and converting previously drafted estimate documentation more precisely it is permissible to carry over the timetables for clients to receive design products that have estimate documentation during the third and fourth quarter of 1983 without charging higher percentages for the credit granted to the design organizations. At the same time it is permissible for clients to receive from design organizations and hand over to construction and installation organizations design documentation for structures and projects that are included in the plan for 1984 that have estimates drawn up under the norms and prices of 1969 within the established timetable (before 1 Jul 1983). For newly begun structures and projects for which estimates have not been worked out under the norms and prices of 1969, information concerning their estimated cost must be presented to contractor construction and installation organizations by clients.

Design and research organizations, for whom the plan for design products and profit will not be fulfilled in connection with the change in the timetables for converting estimates during the second and third quarters of 1983, will make payments to the budget from profits and form economic incentive funds in the amounts specified in their financial plans for the second and third quarters of 1983 from the savings that these organizations have due to a reduction in the net cost of incomplete production work and the profit obtained from turning over design products.

Before converting the estimates to working drawings based on the new estimate norms and prices, credit for the incomplete production of construction and installation organizations must be given according to the estimates compiled under the prices of 1969 while using the index for the change in the estimated cost of construction and installation work and with a subsequent adjustment in the calculations for projects that are intended to be put into operation in 1985 and subsequent years.

USSR ministries and departments and union republic councils of ministers must correlate, according to the program approved by USSR Gosplan and USSR Gosstroy, data on converting the estimated cost of construction and installation work by item estimates according to builders and contractor organizations and submit to USSR Gosstroy, USSR Gosplan, the USSR Ministry of Finance and USSR Stroybank before 1 Jun 1984 summary data on changes in the level of the estimated cost of construction and installation work by sectors of the national economy and sectors of industry and in the amounts of contract work associated with the transition to the new estimate norms and prices in construction.

USSR Gosstroy letter No 87-D dated 25 Nov 1982 is recognized as no longer being in force.

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CONSTRUCTION PLANNING AND ECONOMICS

WAYS TO LIMIT URBAN EXPANSION EXAMINED

Yerevan KOMMUNIST in Russian 12 Jun 83 p 3

[Interview by APN correspondent Vitaliy Buzuyev with Professor Ivglaf Sigov, director of the Institute of Socioeconomic Problems, USSR Academy of Sciences, Leningrad]

[Text] [Question] U.N. experts are predicting the rapid growth of cities, particularly the major cities. By the year 2000 there will be 30 million people living in Mexico City, and over 20 million in New York, Tokyo and Yokohama, Shanghai.... It is true, however, that no European cities will be among the top 20 giants. Thus, Moscow will give up its present 18th place (8.4 million people) for 30th (less than 10 million). However, there are other major cities in our country. What is their fate?

[Answer] Leningrad, which already has 4.8 million residents, Kiev, (2.3 million), Tashkent (1.9 million), Baku (1.6 million) and almost 20 other of our "millionaires" will also evidently remain far from the predicted records. The future of our cities, and obviously not only the major ones, will be determined with the aid of general plans for their development, a general scheme for population settlement throughout the USSR territory, as well as by other program documents. There is no doubt that urbanization in our country is dynamic as before, but at the boundary of the 20th-21 : centuries its level will be noticeably lower than in the West. By the year 2000 the portion of city dwellers in the USSR will probably exceed 75 percent, as compared with 63 percent today. It has already reached 76 percent in Canada, 86 percent in Australia and 88 percent in the FRG.

[Question] Our state is implementing a policy which provides for the limited growth of major cities. How is this carried out in practice?

[Answer] First of all, limitations are placed (and sometimes prohibitions) on the construction of new plants and factories in such cities. The technological retooling of operating enterprises is another matter, since it is this which ensures the further development of production. Naturally, in adhering to these requirements they are not to increase their staff, area, and especially the amount of generated waste products. Only facilities which are most indispensable may be added to existing industrial facilities, as for example for the purpose of improving service to the population or more fully meeting the needs of the domestic, communal, or road management.

[Question] What if the emergence of new production is inevitable?

[Answer] New sectors (in Leningrad this is automatic device technology, powder metallurgy and others) may develop in the area which is cleared for them. More precisely, on the area of those enterprises and organizations which are taken out of the major center and relocated to the mid-size and small cities where there are growth reserves and where it is not only possible, but also preferable to locate shops and plants, laboratories and institutes, and branches of scientific-production associations.

[Question] The large center is undoubtedly the winner. What about its surroundings?

[Answer] They will come out ahead also. For example, Leningrad favorably influences development of its oblast with its huge industrial and scientific potential. For instance, in the 10th Five-Year Plan the second and third power blocks of the Nuclear Power Station imeni V. I. Lenin near Leningrad were put into operation, the capacities of the Svetogorsk and Syas'k Cellulose-Paper Combine, the Tikhvinsk productions of the "Kirovskiy Zavod" Association, and of tens of other enterprises were increased. The economic as well as the social shifts are obvious. The mid-size and small cities, and even the villages are being transformed. The closer proximity of industry helps to overcome the seasonality of field work, to provide winter work for the village residents at neighboring plants, etc.

[Question] But if the enterprise is transferred to an oblast, this means that the workers have to move together with it or lose their jobs.

[Answer] Neither one nor the other are mandatory. In relocating plants from a major city to the oblast, the task of attracting local labor resources, from which qualified personnel must be prepared, must be met, those who remain in the large city will always find application for their efforts. People are needed everywhere, they are in short supply for a number of sectors. Also, the administration cannot lay off "extra workers without concerning itself as to their fate. It must help them to find a job, to provide, for example, retraining in connection with a change in profession.

[Question] Judging from all of this, there seems to be a multitude of interrelated problems here, and it is not so easy to deal with them as a whole, in their entirety. What is being done for their effective solution in the complex?

[Answer] Of course, many factors must be considered in their interrelation, as well as in their dynamics for the visible future. One of the solutions: a Comprehensive Plan for economic and social development has been compiled for Leningrad and the oblast, where the needs are tied in with the capabilities, the sector interests--with the local labor resources, the needs of the enterprises and city management--with the capacities of construction organizations, etc. The oblast and its center are viewed, understandably, not as being isolated, but as a single object of management.

Obviously, it is difficult to give a comprehensive substantiation of the long-term strategy of urbanization. However, this is facilitated by the unified national economic policy, which provides for the coordination of all programs, local and all-union, providing for territorial and sector planning. As a result, it is possible, no matter how complex, to contain the growth of the large cities and to regulate the development of mid-size and small cities within optimal limits, not permitting the spontaneity which results in gigantomania.

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CONSTRUCTION PLANNING AND ECONOMICS

MORE VERTICAL, HIGH DENSITY CONSTRUCTION FOR MOSCOW IN FUTURE

Dushanbe KOMMUNIST TADZHIKISTANA in Russian 9 May 83 p 4

[Article by APN correspondent Marina Vasil'yeva: "Moscow Will Grow Upward"]

[Text] Until quite recently Moscow residents knew the Strogino Rayon only as a place of rest, with its wonderful sandy beaches. Today a new residential area is growing up here, where 120,000 Moscow residents will soon live.

The outlines of the future rayon are already becoming visible--high multi-story residential blocks, kindergarten and school buildings, polyclinics and stores. In time there will be a sports complex.

"We may cite numerous examples of the construction of such micro-cities within the capital city limits," says the Deputy Chairman of the Mossoviet Ispolkom and Chairman of the City Planning Commission Vladimir Bitunov. "However, it is not this which today determines the general line of development in our city. The fact is that there is already open territory within the Moscow city limits. Around 35 percent of the new residential construction will be located on it. The main portion of the houses, however--50 percent--will be erected in the regions of mass building which emerged in prior years. The remaining new construction will be focused in individual sections of portions of the city formed long ago."

"What general tendencies in the construction of the capital have been noted in recent years?"

"First of all, it is the more careful attitude toward each hectare of urban area. In particular, we are planning to increase the housing density. The story height of buildings will increase significantly. Five-story buildings will be a thing of the past. They will be replaced by 16-20 story units with modern design and improved room planning."

"What is in store for the old rayons of the city?"

"Restoration work will be continued here. Our task is to preserve for our descendants the appearance of old Moscow. Therefore, all structures which have any historical or architectural value are protected by the state. Only old houses which are no longer usable are subject to demolition."

"What is the social aspect of the capital's construction program?"

"Simultaneously with the operational introduction of new residential buildings, new kindergartens and nursery schools, polyclinics and hospitals, trade and public dining, domestic and communal service enterprises are being opened."

"Much attention is also given to the "health" of the capital. In accordance with the general plan for socio-economic development, the construction of industrial enterprises in Moscow has ceased. The exception to this is presented only by those enterprises which are intended for serving the population. However, the development of existing plants and factories is taking place only by means of their reconstruction, technical retooling and equipment modernization, and by radical improvement of the working conditions."

"What will this year bring to Moscow residents?"

"This year Moscow residents will get 3,450,000 m² of living space (on the order of 80,000 apartments). There will be 75 new kindergartens, 23 schools, 11 hospitals, and 14 polyclinics in the city. New houses of culture, clubs, movie theatres and libraries will greet their first customers. The network of domestic service enterprises will be significantly expanded. Urban transport will undergo further development. New metro stations will link the center of the city with the micro-rayons currently under construction."

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AGRICULTURAL CONSTRUCTION

MODULE USE SPEEDS UP RURAL CONSTRUCTION IN UKRAINE

Kiev RABOCHAYA GAZETA in Russian 26 Jul 83 p 2

[Article by I. Kishchenko, director of press center, UkrSSR Minmontazhspetsstroy: "APK: The Complex's Assembly Shop"]

[Text] The construction sites of the agro-industrial complex are named in the Food Program as the country's most important sites. The collectives of the UkrSSR Minmontazhspetsstroy organizations are performing vital work at these sites. Last year they participated in building over 90 projects. The fact that most of these were placed into operation ahead of schedule reflects favorably on the installers. It is difficult to name even a single project where the work plans were not fulfilled.

An outstanding example is the construction of the Kharkov group of agricultural machine building projects. The creation of facilities for manufacturing high-power T-150K wheel tractors has been completed at the "Kharkov Tractor Plant" production association. New shops and production facilities have appeared at the tractor engine plant, at the Kupyanskiy Casting Plant, at the Dergachevskiy Turbine Compressor Plant, and at the Chuguyevskiy Fuel Apparatus Plant. Moreover, the available housing for these enterprises has increased by 170,000 m² of living space.

Along with the construction workers of "Khar'kovpromstroy" and "Khar'kovzhilstroy", the installers from the "Khar'kovstal'konstruktsiya", "Promtekmontazh-1", "Yuzhelektromontazh" and other trusts also did excellent work. The high quality of work was greatly conditioned by the fact that the work production projects provided for progressive technical decisions which allowed the performance of installation work using the most modern, economic methods. Large-block, consolidated equipment installation was used everywhere, with provision of its full plant readiness.

The newest installation methods were used at all construction sites of the agro-industrial complex, as a result of which the project delivery times were significantly reduced. This was the case at the construction of the Kremenchugskiy Protein-Vitamin Concentrate Plant, two lines of which were placed into operation ahead of schedule; in the creation of new production capacities at the Kiev, Melitopol, Stryy, and Glukhov Meat Combines; at the Novograd-Volynsk, Voznesensk, Zolotonoshsk and Zvenigorodsk Cheese Plants; at the

Simferopol and Kiev Beer Plants, and in the construction of large sugar plants (each with a capacity of 60,000 tons of processed sugar beets per day) in the Khmel'nitskiy, Vinnitsa and Kirovograd Oblasts.

The so-called perspective planning was of great help to the installers. Its essence consisted of the fact that the installation organizations establish practical ties with the project planning, design and scientific-research institutes participating in planning the project construction for the agro-industrial complex.

The benefit of such cooperation cannot be doubted: the installers are able to perform work using the most modern methods and means and, consequently, to significantly reduce the installation and overall construction time. "UkrPTKImontazhspetsstroy", the ministry's head institute, has recently noticeably expanded its scale of perspective planning, establishing working ties with "UkrGipropishcheprom", "VNIIzhivmash", "UkrGipromyasomolprom", "UkrGiprosakhprom", and "Yuzhgiprobiosintez". As of the start of this year, a plan of joint work has been ratified, and the installation organizations have named permanent representatives to participate in the development of project documentation.

The ministry board resolution provides primarily for supplying materials, units for installation, and auto transport to organizations engaged in the construction of projects within the Food Program. In particular, the decision has been made to complete within the first 6 months the delivery of metallic constructions to these sites.

An especially large volume of work must be performed in building facilities for the production of mineral fertilizers, most of which must be placed into operation in 1984-1985. The installation organizations are preparing most thoroughly for work at these projects. After all, the chemical enterprises are equipped with the most complex technological equipment whose installation requires great precision and flawless quality.

"Aside from the construction of new enterprises and facilities," explains Deputy Chairman of the Commission on Questions of the Agro-Industrial Complex of the UkrSSR Minmontazhspetsstroy V. B. Kardash, "our organizations participate in the reconstruction of presently operating plants, particularly the republic's 150 sugar plants, numerous enterprises in the food, meat-dairy and other branches of industry. Moreover, we are engaged in the construction of 180 facilities for the production, storage and processing of agricultural products. Last year we delivered such facilities to the customers ahead of schedule. In most cases, the installers erected prefabricated module buildings at such facilities."

The modules which V. B. Kardash mentioned are at the present time the most progressive method of erecting production buildings--warehouses, storehouses, and shops--in rural areas. All the module construction parts are delivered to the site at the same time, and simultaneous assembly of the frame, wall panels, heating system, ventilation, and electrical equipment is begun. On

the average, such a building (depending on its dimensions and function) is assembled in three or four months, almost twice as fast as by the ordinary method. Last year, 86 modules were placed into operation.

"This year," continues Vasiliy Borisovich, "the plan calls for the erection of 120 module buildings. However, in many cases the customers--Minsel'khoz, Minplodoovoshkhoz, "Sel'khoztekhnika", Minsovkhozov--have not prepared the work fronts. Recently Ukrglavstal'konstruktsiya took the initiative: it decided to be the sole receiver and builder of modules. This means that the central board will be able to maneuver the powers and means, and consequently significantly accelerate the installation time."

For many years the ministry organizations have been engaged in laying gas lines for the kolkhozes and sovkhozes. Today this work has been significantly expanded. However, it does not always go successfully. There are cases where it takes 10-12 years to supply one kolkhoz with gas. The reason for this is often that the construction organizations of the agricultural ministries and sovkhozes spread their funds over numerous farms.

All this is evidence of the fact that only full agreement and clear interaction of all the participants of one construction project or another can lead to success. The example of the construction of the Kharkov group of projects is clear testimony to this fact. The installation organizations also strive toward such interaction and cooperation.

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HOUSING CONSTRUCTION

POOR QUALITY CONTROL, INDIFFERENCE IN HOUSING CONSTRUCTION CITED

Quality Checking Needs Strengthening

Moscow STROITEL'NAYA GAZETA in Russian 10 Jun 83 p 3

[Article by P. Zubov, chief of administration of Gosarkhstroykontrol' [State Inspection of Architecture and Construction] of Gosgrazhdanstroy [State Committee for Nonindustrial Construction and Architecture] (Moscow): "How Defective Output Gets Started"]

[Text] The problem of raising quality in housing construction is multifaceted. It embraces questions of planning, organizing synchronized work, increasing the degree of factory preparation for building articles, improving the supply and equipment base, and many other things. However, strict observance of production and technological discipline in all parts of the housing-construction assembly line plays just as important a role in raising quality.

We are doing a lot of building, but not always with good quality. Last year, because of poor quality, work was suspended on 3,030 jobs and financing was cut off on 162, more than 116 million rubles were taken out of settlement accounts of construction and installing organizations, fines and pay stoppages were imposed on 3,430 engineers and technicians and 205 officials were taken to court for gross violations of design, the Construction Norms and State Standards. Nevertheless, 685,000 m² of housing turned over for use with work not completed had to be excluded later from the books!

Ask any superintendent or department chief of a KPD [large-panel housing construction] plant: why has housing been built so poorly? And his reply undoubtedly will take you far from the construction project or his plant: in the planning organs, where the introduction of housing is planned mainly for the end of the year, in the quarries, which do not send the type of crushed gravel that is required, at the woodworking combine, which ships poor-quality carpentry products....Let us not deny the supervening factors--deficiencies in planning and supply. But meanwhile, about half of all the discrepancies permitted at, let's say, enterprises that produce prefabricated reinforced concrete, occur because of violations of technological discipline by the workers themselves of these enterprises--blue-collar workers, engineers and technicians.

No additional capital investment of any kind is required in order to eliminate this situation. Mainly, checking the materials that arrive and monitoring current operations throughout the whole industrial chain of housing construction must be arranged for. Primarily within departments of the KPD plants.

Right now the monitoring of materials input practically does not exist at many housing-construction enterprises: whatever the quality of the raw materials that arrive (sand, gravel, lightweight aggregate and so on), they are put to use. What this leads to is well known: if the actual bulk density of the lightweight aggregate is greater than the standard, the heat-engineering parameters of the outer-wall panels are reduced. Checks that have been made have indicated that at not one of the DSK's [housing-construction combines] investigated did these parameters of manufactured panels meet GOST [State All-Union Standard] requirements!

What should plant personnel do? Either return the nonstandard output to the supplier or bring it up to requirements--crush it, grade it and so on, and charge the additional expense to the supplier through arbitration. However, few housing-construction enterprise supervisors dare to impose penalties: very well, then, you spoil relationships--next time you get nothing at all. Such goodheartedness serves housing builders badly: the suppliers get accustomed to the fact that they can get away with supplying substandard output to them.

As has already been said, many violations lead, in the final analysis, to defective output, and the housing builders themselves commit them. Such episodes were observed on visits to enterprises. A vibrator coughs and the concrete consolidates poorly. The OTK [Technical Inspection Section] workers note and report to the department manager in good time that the density of the concrete is below the norm. But the mechanics do not get around to eliminating the malfunction for 3 days. And the plant, meanwhile, produces substandard panels....

Or the rigging that forms the panels gets raised up and no one pays any attention to it. As a result, the panels' geometric dimensions exceed the standard. Small deviations, of 5-6 mm, in the erection of multistory apartment buildings add up, and major misalignments occur that also lead, consequently, to seams that leak and joints that admit the cold.

Often, unfortunately, there are cases where industrial operations not only are carried out negligently but some of them are bypassed entirely. This occurs especially often during the manufacture of carpentry items: after the part has been planed, it is not smoothed and spackled. If one also considers that the seasoning technology is violated, then it is not difficult to understand why, in a new apartment house, the window sash is askew and the surfaces are irregular and rough.

As we see, the causes of these unpleasantnesses are concealed in the fact that someone has not finished his work, someone has missed something, someone has seen something improper but has bypassed it and did not show the proper exactingness. Laxity and disorderliness, which lead to violations of technological

discipline--these are the sources of defective output, for the elimination of which no substantial funds must be spent. All that is required is the establishment of order in production and strict dealing with those who violate the technology. In other words, arrangements must be made for strict monitoring over work quality on each segment of the housing-construction assembly line, and, of course, over the quality of the final product that emerges from it.

The technical monitoring sections at housing-construction enterprises are subordinate to plant management. That is why, when a choice must be made of either closing the gate on inferior output or dispatching it to the construction site in the name of plan fulfillment, preference is given the latter. OTK workers are not empowered to stop production if defective output starts coming off the assembly line. And enterprise managers lack the resolve to take this step--again, it is the plan! And instead of directing his wrath against those specifically guilty of the defects, the director aims it at the obstinate OTK.

The technical monitoring sections must be removed from subordination to the enterprise itself, in order to close the plant's gates on poor-quality output. Suppose that at first the transfer of the OTK to the jurisdiction of the higher organization leads to a partial stoppage of production. Then both the blue-collar workers and the engineering services will feel that they must not permit low-quality production work.

Local Gosarkhstroykontrol' organs should play an important role in raising the quality of construction. However, GASK [Gosarkhstroykontrol'] services do not exist at all in 1,500 cities and towns subordinate to republics and oblasts and in almost the same number of rural rayons. Republic councils of ministers and oblast ispolkoms should pay earnest attention to this. Right now the existing oblast and kray Gosarkhstroykontrol' inspectorates expect help from local soviets of people's deputies. The fact is that these services themselves are undermanned. For example, the Leningrad Oblast GASK inspectorate consists of seven people, Tula Oblast's three, and in many cities one or two inspectors are at work.

Under such circumstances the effectiveness of GASK organ activity depends greatly upon joint, coordinated work with the quality inspectors of trusts and main administrations, the client, and the design institutes, which are executing designers' surveillance. A coordination plan for checking will enable the maximum number of jobs to be monitored. (Nowadays it still happens frequently that two or three checkers come to one construction project, one after another, but do not have the time for other jobs.) The results of all these checks, in coming under the GASK service, should become the basis for imposing financial and economic penalties against enterprises and organizations that commit serious violations when erecting a facility.

The construction-monitoring service also needs help of a purely organizational nature. It is no secret that many of them do not even have a normally equipped workplace--a separate room and file cabinets and safes for storing papers. Not by far does the inspector of the local service always manage to have the services of equipment operators available on short notice. In rural rayons, where the jobs are tens or even, at times, hundreds of kilometers

away, the question of providing means of transport inevitably arises. As a rule, the inspector has to take the regular bus lines or passing vehicles. Therefore, arrival at the facility is at times delayed and much time and effort are wasted.

The qualifications of the GASK workers themselves should also be dwelt upon. The fact is that the current pay rates for inspectors is by far lower than those of, let's say, line engineers at the construction projects. It is obvious that work in an inspectorate scarcely entices a builder who is experienced and knows the business. Therefore, we basically get young specialists who have neither adequate experience nor stature. In order to increase the effectiveness of the work of GASK organs and to raise the skill levels of their staff workers, the pay for their work must be increased to the pay levels of line personnel. This problem could be solved also by attracting experienced engineers and builders who have retired on pension, and, in this case, by extending to the Gosarkhstroykontrol' service the principle of preserving the full pensions for these workers.

* * *

We talk and write a lot about quality. At various levels and about various aspects. And, at times, the question arises: do we not complicate the problem too much, when the question can be resolved more simply? In order to build housing well, not one operation can be carried out poorly. It is to this end that the efforts of all who do the actual work and all who should monitor the quality of their work must be directed.

Tajik Construction-Quality Monitoring

Dushanbe KOMMUNIST TADZHIKISTANA in Russian 29 Apr 83 p 1

[Editorial: "Monitor Housing Construction!"]

[Text] The social program contemplated by the 26th CPSU Congress defined the wide sweep of the construction of housing and of cultural and domestic-services facilities. The party's plans are acquiring visible outlines. Since the start of the 11th Five-Year Plan more than 210 million m² of total housing space has been introduced in the country, housing amenities have been increased, and the network of general-education institutions, hospitals and polyclinics has been enlarged in the country. However, as the CPSU Central Committee decree, "On Measures for Insuring the Fulfillment of Plans for the Construction of Housing and of Social and Domestic-Services Facilities," emphasizes, the state of affairs in this industry still does not fully meet the party's requirements. Tajikistan has been named as one of the Union republics that is not carrying out plans for the construction of housing and of cultural and domestic-services facilities. The erection of housing and of facilities for cultural and domestic-services purposes is being conducted at a slow pace in our republic. Last year a total of 516,400 m² of housing space--86 percent of the plan--was put into operation. Things went somewhat better in the first quarter of this year: the housing plan was fulfilled 128 percent. But in this case it must be considered that in the first quarter it had been planned to turn over to clients housing amounting to about 11 percent of the annual program. Much state capital investment was not assimilated.

Deficiencies in housing and nonindustrial construction touch the interests of all strata of the populace. It is the direct duty of the builders to introduce housing on time and with high quality. Meanwhile, bureaucratic interests still have not been eliminated from construction organizations. Last year, instead of taking steps to turn over a dormitory and an apartment house in two Dushanbe microrayons, the managers of an MVD [Ministry of Internal Affairs] trust and Tadzhikdorstroy [Tajik Road-Construction Trust] transferred the people, equipment and materials to their own facilities.

The responsibility for the pace, deadlines and quality of housing construction is vested not just in the actual performers of the work but also in the top managers of ministries, agencies and other organizations. However, in some cases, strict monitoring of the quality of construction and of finishing work is absent. Not so long ago several families of workers of Vakhshvodstroy [Vakhsh Water-Resources Management Construction Trust] received apartments. Unfortunately, the housing had been turned over with work undone. The responsible workers promised to eliminate the deficiencies in the shortest possible time, but they have not kept their word. This fact did not bother local party and soviet organs--they did not issue a principled evaluation of the actions of the trust's management.

Client agencies are not displaying adequate concern about fulfillment of the housing construction plan. Meanwhile, the time has passed when the client is assigned solely the role of chairman of the state acceptance commission. Representatives of the client today should intrude more actively into the construction process and carry out their obligations with precision.

The interests of the matter require that the multiplicity of authority in resolving questions about housing construction in the city, town and village be ended. At one time, in Orel, the native land of the continuous-planning principle, several tens of clients were counted. A restructuring of the construction assembly line required that they be combined under a single authority--the city ispolkom's UKS [capital construction administration]. Centralization of the service determined to a great extent the success of continuous planning. The example of the metallurgists' city of Tursunzad indicates what the lack of a single client leads to. For many years a dispute has been going on: who here should answer for the construction of nonindustrial facilities--the ispolkom of the city soviet of people's deputies, or the board of the Tajik Aluminum Plant? This situation affected negatively the progress of construction of housing and of buildings for social and domestic-services purposes in this city.

In a number of the republic's cities and towns, where there is a sharp need for worker housing, expensive facilities not of the first priority are being erected. At one of the latest meetings of the Nurek city party committee bureau, the question about the legitimacy of realizing various designs that were made up without taking actual conditions into account was raised. For example, for the facing of the walls and ceilings of the city library, Hungarian toverton and Armenian tuff were incorporated. Extravagances in the architectural layout of such facilities increase their cost and create additional difficulties for suppliers and builders.

An acceleration of the pace and a rise in the quality of the erection of housing are linked with the results of rational organization of the work and an indoctrination of the industry's personnel in a feeling of professional responsibility for and pride in good quality execution of the work. The state of affairs at each facility should be monitored by party and soviet organs and by trade-union and Komsomol committees. It is important to actively introduce advanced experience into each brigade.

And such experience exists. Members of V. Gargola's brigade from the Dushanbe Housing Construction Combine applied a new principle of operation in the construction of prefabricated nine-story apartment houses. They are erecting the nine-story buildings by the shiftwork method. The specialized Monolitstroy [Administration for Monolithic-Type Construction and Installing Work] that was created in Dushanbe has achieved major successes recently. Monolithic-type housing construction, which incorporates everything that is advanced in the industry, has a great future. Several high-rise apartment houses are now being erected by this method.

A guarantee of success in this great and important work of creating contemporary, well-appointed housing for the Soviet people is an increase in monitoring activity and exactingness toward personnel. Cases of failure to meet deadlines for the construction of housing and nonindustrial facilities should be viewed as serious violations of state and production discipline.

Our republic's workers have taken the CPSU Central Committee decree about improving housing construction as a comprehensive action program for the current five-year plan. The joy of housewarmings depends upon the painstaking labor of the builders and upon their high responsibility and precise organization of work.

11409
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BUILDING MATERIALS

EXPERT DISCUSSES MEANS TO IMPROVE CEMENT QUALITY, ASSORTMENT

Leningrad TSEMENT in Russian No 5, May 83 pp 1-2

[Article by A. M. Dmitriyev, candidate of technical sciences: "Ways of Improving the Quality of Cement and Increasing its Varieties"]

[Text] In May 1983 the 6th All-Union Conference on Improving the Effectiveness and Quality of Concrete and Reinforced Concrete will take place in Tashkent convened by the Central and Uzbek republic NTO [scientific technical section] boards in the construction industry together with USSR Gosstroy.

This issue of the magazine is devoted to this conference. Problems of improving the quality and technical and structural properties of cements and also of increasing their varieties are reviewed in it which will promote a further improvement in the technology of concrete work and an increase in the efficiency of using concrete and reinforced concrete.

In the "Basic Directions for Economic and Social Development in the USSR for the Years 1981 to 1985 and for the Period to 1990" which were approved by the 26th CPSU Congress it specifies the following for the building materials industry:

"To expand the output of high quality grades, multi-component and special cements.

To develop capacities for producing building materials by using cinders and slag from heat producing power plants, metallurgical and phosphorous slag, waste products from mining sectors of industry and coal enrichment factories...

To accelerate the development and adoption of energy conserving technologies in the production of cement..."

Work is continuously being done by enterprises and institutes in the cement industry to increase the varieties and improve the quality of cement and also to use waste products from other sectors of industry and raw materials as additives during the production of multi-component and special cements. The production of quicksetting cement (more than 9 million tons), grade 500 cement

(about 25 million tons), grade 550 and 600 high strength cements (more than 1.5 million tons) and also a number of special cements--roadway, sulfate resistant and others (about 80 grades in all) has been mastered.

When producing these cements the content of C₃S is increased, the content of C₃A and gypsum is optimized and also the fineness of the grist is improved.

The conversion of burning clinker into ashless fuel also aided in substantially improving the active properties of cement.

Data on the output of cement by grades in 1981 and on the demand for the needs of construction in 1985 (data from NIIZhB [Scientific Research Institute on Reinforced Concrete]) is given in the table.

Grade of Cement	Actual Output in 1981 %	Demand for Cement in 1985
300*	14.5	27.3
400	63.1	48.3
500	21.3	22.7
550	0.7	1.2
600	0.4	0.6
Average grade	409.0	399.0

* Including cements for construction mortars.

As is evident from these data the average grade of cement produced is substantially higher than the grade needed for a construction binding agent since the output of grade 300 cements and cements for construction mortars is substantially lower than demand.

Increasing the output of grade 300 cement is hindered in a number of regions by a lack of local mineral additives and the position taken by USSR Gosplan which continues to plan the average grade of cement for the sector even though this indicator has outlived its usefulness.

The production of grade 500 cement almost corresponds to demand although significant disproportions do exist for certain regions--overproduction in some regions and substantial deficits in others. The volumes of high strength cements (grades 550 and 600) being produced are still insufficient.

To meet the needs of construction 11.4 million tons of portland cement without additives were produced for general construction purposes in 1981, and when considering sulfate resistant, hydrotechnical and cement for reinforced concrete (according to the TU [technical administration]) the total output of such cement amounted to 14.9 million tons (not including cements for asbestos cement products, patching, roadways and export).

This amount of cement without additives is sufficient for producing no less than 20 to 25 million cubic meters of reinforced concrete and high grades of concrete.

However, an analysis of the actual use of portland cement without additives at many enterprises in the construction industry has shown that it is consumed for the same purposes and according to the same norms as portland cement with mineral additives and even as the same grade of slag portland cement. This leads to a substantial overconsumption of fuel and energy resources.

What has been said also pertains to a certain degree to high strength cements. The amount that was produced in 1981 is sufficient for making more than 2.0 million cubic meters of concrete grade 500 and higher. Actually the production of such concretes is insignificant and it is forecast that their production will increase by only a small amount in 1985.

The output of self-stressing cement depends to a great degree on limited resources of alumina slag and on organizing the production of their substitutes--other expansive components.

From the standpoint of reducing combined energy consumption to produce concrete and reinforced concrete products, it is well known that the most economical is portland cement, the output of which has been substantially reduced in recent years.

In order to fulfill the resolutions of the 26th CPSU Congress for economizing fuel and energy resources it is necessary to increase production of slag portland cement and other multi-component cements while reducing the output of cements without additives somewhat.

At the present time a scheme is being worked out at the NII [Scientific Research Institute] for Cement to develop and locate the production of highly economical multi-component cements among the regions of the country having in mind first of all the elimination of the disproportion in the output of cements grades 300, 500 and higher.

With the aim of economizing fuel and energy resources it is necessary to quickly develop the dry method of producing cement. However, it should be kept in mind that the quality of the clinker that is burned in furnaces by the dry method is somewhat lower due to the features of the technology.

In connection with the necessity of economizing TER [fuel and energy resources] a further increase in the content of alite in the clinker and also an improvement in the fineness of the grist of the raw materials and cement is being restrained and the transition of a portion of plants to coal fuel is being carried out. These factors, and also the exhaustion of production funds at a number of enterprises, is substantially complicating the output of high grades of cement and requires the use of new technological means for preserving and improving the quality of cement.

In addition, the exhaustion of supplies of high quality raw materials as a result of many years of exploiting the operating open pits and also the construction of new enterprises using the dry method of production in the worst locations should also be considered.

In other words, the sole potential for increasing the quality and expanding the varieties of cement under these conditions is to adopt the achievements of science and use the results of the theory of hydration and of improving the active properties of cements which is being intensively developed at the present time by a number of scientific research organizations including the NII for Cement.

This makes it possible to plan new methods of improving the quality of cement among which there are those that have already undergone production testing and have been worked out during the course of recent industrial experiments.

One of these methods is to optimize the modified content and structure of portland cement clinker and also to prevent the formation of phases in it that reduce its active properties.

It is necessary to eliminate the formation of slowly cooled glass in clinkers that are obtained in rotary furnaces including caustic aluminate or Ca_2Al_7 and also the formation of aluminogel during hydration in the internal liquid phase and hardening by the aluminate mechanism with the subsequent phase conversions. The elimination of such glass is often a difficult task associated with supplying plants with supplementary refined mixtures of raw materials.

An active method of controlling the microstructure and modified composition of a clinker is to cool it very quickly before removing it from the rotary furnace to the refrigeration unit.

The adoption of such procedures is proposed at the present on limited scales.

Grouped with the new but already sufficiently widely adopted methods is improving the particle size of the content of cement with the aid of additives--superplasticizers introduced in a mill in amounts from 0.12 to 0.20 percent of the mass of cement. They make it possible, along with plasticizing, to radically increase the content of average fractions in cement up to 70 to 75 percent during grinding in open cycle mills to a relative area of 3200 to 4000 square centimeters per gram.

With the aim of stimulating expenditures for organizing the qualified production of superplasticizers it is necessary that enterprises be granted a portion of the economic effect of improving the grade of cement to be used for the needs of the collective.

Developing the production of superplasticizers and the output of cements with them is specified by an inter-sector overall special purpose program. At the present time superplasticizers are used at the Sebryakov plant and Amrosieyevka combine; their use is planned at the Slantsy plant, the Zdolbunov combine, the "Vol'sktsement" PO [Production Association], etc.

The increase in the active properties of cement when introducing LSTM-2 (technically modified lignosulfonate) amounts to 3 to 20 megapascals (7 megapascals on the average) depending on the composition and structure of the clinker.

It is expected that by 1985 the cement industry will obtain such a quantity of plasticizers that would make it possible to a certain degree to solve the problem of turning out cement grades 500 to 550 in a number of regions where it is still not possible to do so.

This same program specifies development of the production of cements with complex sulfoalumosilicate additives that act as a primer for the crystallization of hydrosilicates and a triple sulfate form of sulfoaluminate calcium (TGSAK). Up to the present time several types of such an additive have been developed which are distinguished by production methods, initial raw materials and the dynamics of growth in the strength of the cements. All of these increase the degree of hydration, the grade strength, frost and sulfate resistance, water impermeability and resistance to cracks, and also reduce shrinkage, deformation, porosity, the maximum size of the pores, the loss of the cement's active properties during storage, and others.

The chemical affinity of the action of this additive is associated not only with the absorption of lime and the synthesis of an additional amount of hydration phases but also with an improvement in the solubility of silica and an increase in the content of its admixtures in TGSAK (stabilized silica) and also of calcium in hydroaluminates (destabilized). The conversion of hexagonal hydroaluminates into cubic (with structure disintegration) usually occurs in the first days of hydration and does not harm the strength of the liquid. Experimental batches of such cements have been produced at the Podol'sk plant and the Amvrosiyevka and Zdolbunov combines.

The production of sulfoalumosilicate additives is planned in several regions of the country on the basis of wastes from the chemical and metallurgical industry.

The third method specified by the overall special purpose program is obtaining cement on the basis of a sulfoaluminate clinker (SAK), the composition of which is made up of anhydrous sulfoaluminate $C_4A_3S_3$, a fast hydrating mineral with an activity of about 30 megapascals two hours after the start of hydration and 47 megapascals after 24 hours which makes it possible to produce especially fast setting cement (OBTTs). We will combine anhydrous sulfoaluminate only with a low content (up to 40 percent) of alite in the clinker. Roasting of the SAK is accomplished with a reduced consumption of fuel.

When adding SAK in typical portland cement it is possible to obtain an increase in the strength of articles after thermal treatment of no less than 5 megapascals.

Another that is similar to OBTTs is fluorinated cement containing 20 to 30 percent flormayenite $11 CaO \cdot 7 Al_2O_3 \cdot CaF_2$.

Both types of cement have been produced at the Podol'sk cement plant in the form of experimental batches. Their production is limited by a deficit of aluminate raw material components and their use is for quick hardening. Since these cements are indispensable for urgent repairs and winter work, NII for Cement is continuing research on regulating their hardening time. Additional capital investments are required to organize the production of such cements.

The task of the cement industry for the period to 1985 consists of satisfying the needs of construction to the maximum in conformity with the varieties of cement determined by NIIZhB together with NII for Cement. Along with this the principal portion of it will be produced by existing technology with the exception of the use of superplasticizers that will make it possible to expand the area of production and use of cement grades 500 and 550.

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BUILDING MATERIALS

GAINS, SHORTFALLS IN CEMENT PRODUCTION REVEALED

Moscow STROITEL'NAYA GAZETA in Russian 18 May 83 p 2

[Article: "The Goals Have Long Been Charted: An Economic Review"]

[Text] In recent years the construction materials industry has been increasing the output of economical and progressive materials. Production of quick-drying and decorative cements, of high-grade cements, and also of special types--tamping, sulphate-stable, and others--has grown. And this is natural. For example, the high-grade cements alone provide an opportunity to economize some 10 to 20 percent on this material.

Every cement enterprise of the USSR Ministry of Construction Materials has now worked out a long-term program of economy and rational use of resources. In 1981, 224.1 kilograms of conventional fuel were expended for the kilning of one ton of clinker. By 1985, it is necessary to lower the specific outlay for this to 216, and by 1990, to 210 kilograms.

However, one undesirable tendency has become evident: the expenditure of energy resources in this area is growing. In order to achieve the rates of expenditure intended for the enterprises at the end of the 5-year plan, fundamental reconstruction of the working equipment, further improvement in the organization of labor and technical processes, and more active inculcation of scientific-technological progress are required. Naturally, this is being attended by no little capital expenditures. But there are also other ways of increasing the efficiency of the work of the cement workers.

To begin with, there is the conversion of plants from the wet to the dry, semidry, and combined method of producing cement. The share of dry method in world practice exceeds 60 percent. During the 5-year plan, this share will be increased by 3.5 to 4 million tons. The increase is relatively small, but it allows the saving of 230 to 270 thousand tons of conventional fuel. Consequently, more serious attention must be allotted to this trend in the development of the cement industry.

The conversion of plants to the dry or semidry method of production by means of reconstruction of oven units, equipping them with behind-the-stove forced-air heat exchangers and decarbonizer-reactors, can be very effective. This permits not only lowering the expenditure of fuel, but also approximately triples the

productivity of the ovens. The method is more applicable where there is no free territory for construction of new technological lines.

As is generally known, one of the factors that affects the efficiency of reconstruction of functioning enterprises is cutting down of equipment standing idle, the possibility of gradually opening and replacing various oven units. And here there is a certain test. By way of illustration, the Yuzhgiprotsement Institute revealed the possibility of constructing banks of forced-air heat exchangers above a functioning oven at the Amvrosiyevskiy cement plant. During repairs, it was sufficient to set up a gantry above the oven, and then to carry out the dismantling of its parts and to link the rest of the body with the mounted heat exchangers. Similar construction is admissible for many cement enterprises. Let us add that scientists have already worked out a method of mounting new condensers, for the most part, while adjustable stoves are in operation. Hence, it is possible to carry on reconstruction with a negligible lowering of production output.

In the conversion of enterprises to the semidry method, the advance dehydration of the sediment by powerful filter presses is very effective. The expenditure of fuel is lowered sharply, and the productivity of the oven units is raised from 10 to 40 percent. The USSR Ministry of Construction Materials intends to convert 59 large ovens to the semidry method. According to preliminary calculations, 159 powerful filter presses are required for this. If this work is accomplished in compressed time, it is possible to save 2 to 2.5 million tons of conventional fuel during the 5-year plan. Hence, by 1990 the annual saving of fuel should exceed a million tons.

The so-called low-temperature technique of kilning clinker is also an efficient trend. As it is planned to obtain some 1.3 million tons of cement a year by this method, this will allow a saving of some 100,000 tons of conventional fuel. Unfortunately, this method in fact has not gone beyond the bounds of experiment.

The broad production of compound and special types of cements will yield many benefits because of the use of byproducts of various branches of industry. More than 30 million tons of various additions are now used per year: slag, sediments, ashes, and so forth. This allows a lowering of the requirement of natural raw materials by 15 percent and of the expenditure of fuel by 2.5 million tons, and the saving of a large amount of electrical energy.

Cement enterprises employ more than 22 percent of various additions in technical raw materials. Annually, they obtain a savings equivalent to an additional production of 12 to 14 million tons of cement in comparison with the non-additive method of production. This is equivalent to the annual output of 6 or 7 powerful cement plants, the building of which would require 600 to 700 million rubles.

As we see, there are many reserves for lowering the specific rates of expenditure of fuel-energy resources in the field. However, they are far from being fully employed. Some scientific exploits and proposals for raising the efficiency of production are being introduced too slowly and are not substantially influencing the economic indexes of the enterprises. For example, in our country we have worked out, assembled, and tested native systems for preliminary

decarbonizing of a raw-material mixture in a suspended state, which allows raising the productivity of 4 x 60-meter ovens with behind-the-oven heat exchangers by 25 to 35 percent, without increasing the specific expenditure of fuel for the kilning of a kilogram of clinker. Their efficiency has been demonstrated in the example of the units of the Katav-Ivanovskiy and Slantshevskiy plants, but the work of installing valuable technical innovations in the field is going so-so.

The fate of the low-temperature [saline] technique of cement production is also unenviable. Work has been going on for more than 15 years, but the results are very insignificant. For tens of years industry institutes are achieving lowering of the moisture content of sediment. Greater reserves are not being employed here: a one-percent lowering of the moisture content saves 1.5 percent in fuel during kilning of the clinker. The institutes have done little to introduce efficient thinners as an effective means of improving technology although such an available and relatively cheap thinner of sediment as sulphite fermentation (the waste of cellulose paper production) has long been known, which would lower the expenditure of fuel in the kilning of clinker by 2 to 4 percent.

Every year the question of using the byproducts and wastes of other branches of industry becomes more urgent. By way of illustration, now it is already possible to employ ten times more granulated slag, twice as much slag from phosphorous production, pyrite tailings, and also the ashy wastes from TETs, etc. This would aid not only in substantially cutting back on the expenditure of fuel, but also in resolving another task of no small importance--protecting the surrounding environment.

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BUILDING MATERIALS

WIDER USE OF VARIED LIGHTWEIGHT CONCRETE AGGREGATES PROPOSED

Moscow STROITEL'NAYA GAZETA in Russian 25 May 83 p 3

[Article by M. Simonov, corresponding member of the ArSSR Academy of Sciences, doctor of technical sciences, professor: "Three Facets of Porous Stone: To Improve the Production of Reinforced Concrete"]

[Text] The universal and high technical merits of concrete, which have assured it a dominant position in construction, provide the basis for affirming that it will also retain it in the foreseeable future. The chief trends toward improving it are the broadening of the raw-materials base, the lowering of materials-intensiveness and of volumetrical mass, and the improvement of thermal protective characteristics. It is possible to achieve this primarily because of the wider use of porous fillers, particularly on the basis of various industrial wastes.

In 1981, the country produced more than 22 million cubic meters of concrete on porous fillers, which comprises some 10 percent of the total used by volume. Concrete on porous fillers already allows the lowering of the mass of constructions up to 35 percent, the expenditure of steel and cement up to 10 percent, and the expenditure of labor up to 20 percent.

By the start of the current 5-year plan, the volume of annual production of such fillers comprised slightly more than 38 million cubic meters. The base share of them for keramzit is 25.92 million cubic meters (68 percent). The rest--schungizite, [agloporit], swelled perlite, slag pumice, vermiculite, ash gravel, natural porous fillers--comprise from 0.11 to 16.8 percent.

The complex correlation of the production of their separate types with the predominant role of keramzit is not warranted. In light of the generally-known resolutions concerning the raising of the efficiency of the use of fuel-energy resources, keramzit requires a very large expenditure of energy per cubic meter--103.2 kilograms of conventional fuel and 24.8 kilowatt-hours of electrical energy. The average cost of a cubic meter of keramzit is also high. Natural porous fillers are much cheaper.

As we see, from the position of cost and saving of fuel, the production of natural porous fillers, and also of slag pumice and [agloporit], is much cheaper and more energy-conservative. However, not one of their known types

can claim the right of monopoly. For example, in many regions of the country there are no required supplies of stone, and the use here of keramzit is, of course, expedient. Incidentally, the data given above are in no way directed against this material--a very important achievement of our construction science and technology. They only confirm the need for a review for the complicated structure of the production of porous fillers.

In the course of several years, ArnnIISA, together with NIIZhB [Scientific Research Institute of Ferro-Congrete], All-Union Scientific Research Institute of Reinforced Concrete, AzNIISM [Azerbaijan Scientific Research Institute of Building Materials] imeni S. A. Dadashov, OISI (Odessa), and other institutes, has conducted complex investigations into the problem "Light Concretes and Constructions from Them." The first GOST [state standard] 22263-76 "Road Metal and Sand from Porous Mountain Rock: Technical Requirements," which regulates the use of all types of natural porous fillers of both volcanic and sedimentary origin, was worked out and put into effect. The monograph "Beton i zhelezobeton na prirodnykh poristikh zapolniteliakh (sostoyanie i perspektivy) [Concrete and Reinforced Concrete on Natural Porous Fillers (Condition and Perspectives)], ready for printing, provides guidance in making articles and constructions on such fillers. In a number of republics, normative documents of regional significance have been worked out and are in force.

All this now allows raising the question of the sharp expansion in production of such fillers, and in the first instance--of waste materials in the extraction and processing of tufa, porous limestones, limestones and so forth.

However, this problem has not only construction aspects.

In the extraction and processing of stone, attention is generally not paid to waste material. Moreover, the extraction is conducted not on the whole thickness of useable stratum, inasmuch as in its lower strata the stone is usually of greater strength.

If, at this stage, a decision limits the processing into filler only of new waste materials formed in the extraction of the stone, this already provides for obtaining some 60 million cubic meters of road metal and sand annually at a price 480 million rubles less than that of the same quantity of keramzit fillers, for the production of which some six million tons of conventional fuel and 1.5 milliard kilowatt-hours of electrical energy are required.

But there is a reason that urgently requires resolution of the problem of old waste materials accumulated in deserted and active quarries, with the goal of their complete extraction and the carrying on of recultivation work on the disturbed lands and their return to agricultural use.

It is possible to obtain an idea of these problems in this example. In the ArSSR, which occupies 0.133 percent of the country's territory, the areas of disturbed lands just considered comprise more than 7,000 hectares. Concerning the reserves of stone remaining in worked-out quarries in the form of waste materials and untapped lower-lying strata, it is possible to judge from the experience of the operation of the Artikskiy tufa deposit, which is generally known in the country.

Its half-century of operation assured the obtaining of 15 million cubic meters of needed production in the form of piece wall stones and facing slabs, but at the same time led also to negative results--the formation of up to a thousand hectares of disturbed lands and the accumulation thereon of some 50 millions of tufa waste materials, under which were buried some 400 million cubic meters of untapped lower-lying strata of material. In such circumstances, the further working of the deposit is possible only deep down, and not in breadth.

From what has been said, it follows that expansion of the production of natural porous fillers is the most long-range decision. This would permit assuring savings of very significant means and hastening a return to agricultural use of thousands of hectares of land.

The stated conception should have nothing to do with regions where reserves of porous rock are just beginning to be exploited. Here from the very start their extraction and processing should be conducted according to the rules of production without waste and of the legislation in force concerning recultivation of disturbed lands in worked-out quarries. From this point of view, it is hard to overestimate the tremendous importance of the decision recently made by Minvostokstry regarding the efficiency of utilization of Kamchatka volcanic slag and pumice for the production of prefabricated reinforced concrete constructions in the Far Eastern and Transbaykal regions. In Kamchatka there are unique reserves of pumice, volcanic slag, tufa, perlite, ashes, etc., i.e., the same types of natural porous fillers as in the ArSSR. But if in Armenia at a future date there must be a review of the nomenclature of the porous fillers that are being produced because of the need to resolve the question to waste materials, in Kamchatka it is possible to avoid this.

The problem of expanding production of natural porous fillers, first and foremost on the basis of processing the waste materials of mountain rock of volcanic and sedimentary origin, and the related problem of recultivation of disturbed lands in worked-out quarries, merits the special scrutiny of the appropriate higher organizations.

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